

Forensic Neurology: Practice Considerations and Training Opportunities

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Abstract

Neurologic evidence, including MRI, PET, and EEG, has been introduced in more than 2,800 criminal cases in the past decade, including 12% of all murder trials and 25% of death penalty trials, to argue whether neurologic diseases are present, contribute to criminal behavior, and ultimately whether the defendant is less criminally responsible, competent to stand trial, or should receive a reduced punishment for his or her crime. Unfortunately, neurologists are often not involved in these criminal cases despite being the medical specialty with the most relevant training and expertise to address these issues for the court. Reasons for the absence of neurologists in criminal cases include a lack of awareness from lawyers, judges, and other expert witnesses on the value of including neurologists in forensic evaluations, and the lack of experience, training, and willingness of neurologists to work as expert witnesses in criminal cases. Here, we discuss forensic neurology, a field bridging the gap between neurology, neuroscience, and the law. We discuss the process of performing forensic evaluations, including answering 3 fundamental questions: the neurologic diagnostic question, the behavioral neurology/neuropsychiatry question, and the forensic neurology question. We discuss practical aspects of performing forensic expert witness work and important ethical differences between the neurologist's role in treatment vs forensic settings. Finally, we discuss the currently available pathways for interested neurologists to receive additional training in forensic assessments.

Introduction

Neurologic evidence has been introduced in criminal cases for more than 150 years to determine whether a defendant is competent to stand trial, criminally responsible, or should have a reduced punishment if convicted of a crime.¹ This use has increased exponentially over time² to more than 2,800 criminal cases in the past decade,³ including 12% of all murder trials and 25% of death penalty trials. Forensic neurology is a field that aims to bridge the gap between neuroscience, neurology, and the law, providing scientific evidence and medical expert opinion in these cases.⁴ Despite the potential benefits of forensic neurology, there are significant challenges to its implementation, including the lack of exposure to forensic issues during neurology training and the lack of standardized guidelines or CME activities for neurologists already in practice. This article aims to provide a framework for neurologists interested in conducting forensic neurologic examinations, expounding on the practical aspects of this line of work, and providing an overview of current training pathways.

Case Study

On October 27, 2018, a 46-year-old man in Pittsburgh, Pennsylvania, killed 11 worshippers at a Jewish synagogue, perpetrating what is considered the deadliest anti-Semitic attack in US history. His defense team posed several questions during the sentencing phase: did the perpetrator have brain damage that made him unable to control his behavior, and were his antisemitic beliefs delusions?

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Evidence presented included MRI scans, PET scans, EEG tests, and neuropsychological and neurologic examinations. Contrasting narratives were produced by the defense and prosecution regarding what brain abnormalities were present and what effect these had on his criminal actions. At trial, these competing opinions were largely derived from the testimony of expert witnesses in various fields. Forensic neurologists played a critical role in this process by integrating neurodiagnostic evidence and relating these findings to potentially relevant behavioral and neuropsychiatric symptoms. The jury was instructed to consider several mitigating factors related to expert neurologist's testimony, such as whether the defendant had brain abnormalities. Ultimately, the jury largely rejected arguments that the defendant's brain was abnormal, and he was sentenced to death on August 2, 2023.

What Is the Approach a Forensic Neurologist Should Take?

The approach to forensic neurologic evaluations is elucidated by Rosner's 4-step conceptual framework for forensic psychiatrists,⁵ which can comfortably be adapted to forensic neurology:

1. *Issue*: What is the specific psychiatric-legal issue to be considered?
2. *Legal criteria*: In the jurisdiction in which this specific psychiatric-legal issue must be resolved, what are the legally defined terms and criteria that will be used for its resolution?
3. *Relevant data*: Exactly what information (such as part of what might be collected by a clinician following the traditional clinical framework for data organization) is there that is specifically pertinent to the legal criteria that will be used to resolve the specific psychiatric-legal issue?
4. *Reasoning process*: How can the available relevant data be applied to the legal criteria so as to yield a rationally convincing psychiatric-legal opinion.

The Neurologic-Legal Question

Neurologic-legal issues in the criminal setting include competence to stand trial, competence to enter a plea, voluntariness of confessions, testimonial capacity, insanity defense(s), diminished capacity or actuality, automatism defense(s), unconsciousness defense(s), amnesia in the context of forensic evaluations, neurologic assessments of victims or eyewitnesses, sentencing considerations, competence to be executed, treatment of neurologic diseases to restore competence, and release of persons who have been acquitted by reason of insanity.⁶

Legal Criteria

Legal criteria refer to the law or standard used by the court to make decisions such as whether a defendant is insane or

competent to stand trial. For most issues, the "legal criteria" that a forensic neurologist will consider will be the same as that for the forensic psychiatrist, as terms such as "mental disorders" or "mental disease or defect" encompass both psychiatric and neurologic disorders.

Evaluating Relevant Data

A forensic evaluation will differ from a treatment evaluation in several key aspects.⁷⁻⁹

First, the forensic neurologist will typically review much more extensive collateral sources of information than a treatment neurologist, including police records, school records, employment records, military records, jail records, banking or financial records, video recordings, diaries or social media postings, reports from other experts, and extensive collateral interviews, including family, friends, work associates, witnesses, victims, or even defense attorneys in the case of competency evaluations.⁷⁻⁹

Second, a forensic evaluation may require directly interviewing the defendant about his/her motivation and intent for the criminal act to help determine in what way these actions were affected by the defendant's cognitive, behavioral, and neuropsychiatric impairments.

Reasoning Process

The forensic neurologist must use the available data to arrive at a neurologic-legal opinion. This process will involve answering 3 fundamental questions^{4,10}:

1. *Diagnostic Neurology Question*: What is the neurologic diagnosis (or absence thereof)?
2. *Behavioral Neurology/Neuropsychiatry Question*: What is the effect of the neurologic diagnosis on the criminal behavior? This involves careful evaluation of a defendant's cognitive, behavioral, and neuropsychiatric symptoms, establishing these symptoms is related to the underlying neurologic disease, and determining how these symptoms affected the defendant's mental state at the time of a crime.¹¹
3. *Forensic Neurology Question*: Does the alteration in cognitive functioning, due to an underlying neurologic disease, meet the legal criteria for the neurologic-legal issue at hand? This may involve efforts to determine a causal link between the neurologic disease and the defendant's criminal behavior, as well as showing how the neurologic disease substantially impaired the defendant's mental state in a manner that meets the legal criteria

Communicating Forensic Opinions

The forensic neurologist must be able to clearly and concisely present complex neurologic concepts to both legal professionals

and laypeople. Testimony in court is the most crucial form of communication for the forensic neurologist, requiring excellent communication skills and the ability to explain complex concepts in a way that is understandable to a lay audience. The adversarial nature of criminal trials may be uncomfortable for neurologists not accustomed to having their opinions vigorously challenged by opposing counsel on cross-examination.

Distinguishing Forensic and Treatment Roles in Neurology

The role of a forensic neurologist is distinct from that of a practicing neurologist. In the treatment role, the neurologists' primary duty is to advance the welfare of patients, guided by bioethics principles including beneficence, nonmaleficence, autonomy, and distributive justice.¹² Conversely, in the forensic role, the neurologists' primary duty is to educate the jury or judge by applying clinical expertise to legal contexts, guided by the ethical principles of truth-telling and respect for persons,¹³ even if this results in an opinion that is not in the best interest of the evaluatee.

Practicalities of Forensic Work

Initial discussions with attorneys should determine whether neurologic expertise is appropriate for a given case, as well as to check for potential conflicts of interest. Next, the attorney and neurologist must agree on a fee schedule and retainer, with estimates of the amount of time required to provide a thorough analysis based on the records available and the complexity of the case. Pay cannot be contingent on the opinion or results of the case because this could compromise the integrity of the expert opinion.¹⁴

Although some psychiatrists focus their practice completely on forensic cases, it is unlikely that most neurologists would receive enough referrals to practice forensic neurology full-time. Rather, most neurologists will take forensic referral cases in addition to their full-time neurologic practice.

Training Opportunities

There is currently no formalized training or board certification for Forensic Neurology. A behavioral neurology/neuropsychiatry fellowship or a dual-boarded Neurology/Psychiatry residency is useful to neurologists wishing to perform forensic evaluations due to the focus on localizing complex behavioral and neuropsychiatric symptoms. Advanced training in specific diagnostic modalities (e.g., neuroimaging) would also be valuable. However, these fellowships would not provide the requisite legal experience necessary to work as an expert neurologist. Forensic neurologists from diverse backgrounds could provide unique perspectives regarding inequities within the criminal justice system.

Self-directed learning and training opportunities are available through participation in the "Forensic Neuropsychiatry" interest group of the American Neuropsychiatric Association or attendance of forensic-focused CME activities such as those offered by The American Academy of Forensic Sciences, the American Academy of Psychiatry and Law, or the MacArthur Foundation's Research Network on Law and Neuroscience. Neurologists interested in forensic neurology should seek informal peer mentorship with a neurologist experienced in working as an expert witness in criminal cases. Given the limited number of neurologists with this experience, colleague mentors in forensic psychiatry, psychology, and neuropsychology would also be appropriate.

Conclusion

Forensic neurology is a field that offers neurologists the opportunity to use their expertise to serve the legal system. The 4-step conceptual framework proposed by Rosner provides an excellent starting point for forensic neurologists to guide their evaluations to answer 3 fundamental questions: the diagnostic neurology question, the behavioral neurology/neuropsychiatry question, and the forensic neurology question. As forensic neurology continues to evolve, more specialized training opportunities will be necessary. Ultimately, such efforts will improve the appropriate use and prevent the potential misuse of neurologic evidence in the courtroom.

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Continued

Appendix (continued)

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